

[001] CHEMICAL TOILET WITH PUMPABLE STORAGE TANK

[002] FIELD OF THE INVENTION

[003] The present invention relates to improvements concerning chemical toilets and, more particularly, to an improved design which facilitates "pumping out" of the chemical toilet during the normal servicing thereof.

[004] BACKGROUND OF THE INVENTION

[005] There are a variety of chemical toilets 2 which are commercially available on the market (see Figs. 1-3, for example). Each one of these chemical toilets 2 typically comprises a housing 4 with a door 6 which providing access to the interior of the chemical toilet 2. The door includes a conventional locking mechanism 11. The interior compartment 8 generally includes a toilet 10 with a seat 12 which can be flipped up and down, as necessary, as well as lid cover 14 for covering the seat 12. A urinal 16 may also be located within the housing 4 and the urinal 16 typically has a drainage outlet 18 in the bottom thereof which is connected to a storage tank 20, via a conduit 22, so both the toilet 10 and the urinal 16 discharge into the same storage tank 20 thereby assisting with cleaning of the chemical toilet 2. Typically the bottom of the storage tank 20 is flat and the storage tank 20 is filled with a desired disinfectant and/or chemical solution which is conventional and well known in the art.

[006] Once the chemical toilet 2 has been sufficiently utilized so that servicing thereof is required, service personnel is called and will arrive in a servicing vehicle at the site of the chemical toilet 2. The service personnel will open the door 6 and place a pumping hose 24, via the toilet opening 26, into the storage tank 20 (see Fig. 2) such that an inlet 28 of the pumping hose 24 is located closely adjacent the flat bottom surface of the storage tank 20. Thereafter, the service personnel will activate the service vehicle and suck or pump out the content of the storage tank 20 into a waste product collection reservoir located on the service vehicle. Once this has been completed, the service personnel removes the pumping hose 24 from the storage tank 20 and then washes the interior compartment 8 of the chemical toilet 2 with fresh water to clean the interior compartment 8 of the housing 4 and/or may provide a brief cleaning of the inside of the storage tank 20. If desired or warranted, the service personnel may then pump out further liquid from the storage tank 20 before adding an additional supply of a liquid disinfectant to

the storage tank 20, e.g., pouring two to five gallons or so into the storage tank 20. Thereafter, the chemical toilet 2 is then ready for further use.

[007] One of the associated problems with prior art toilets is that when the service personnel removes the pumping hose 24 from the toilet opening 26 and then removes the same from the housing 4 out through the door 6, liquid and debris contained within the inlet 28 typically drips out from the pumping conduit 30 and soils the toilet 10, the toilet seat 12 and/or lid cover 14, the floor of the interior compartment 8 of the housing 4, etc., thereby creating a mess.

[008] Another drawback during cleaning is that service personnel is not readily able to spray the fresh water into the interior of the storage tank 20, while the pumping operation is occurring, to facilitate better cleaning of the interior of the storage tank 20. Lastly, the current cleaning process is relatively cumbersome and time consuming for the service personnel.

[009] SUMMARY OF THE INVENTION

[010] Wherefore, it is an object of the present invention to overcome the above mentioned shortcomings and drawbacks associated with prior art chemical toilets.

[011] Another object of the present invention is to speed up the cleaning time for servicing a chemical toilet by service personnel.

[012] A further object of the present invention is to provide a chemical toilet in which the toilet can be properly serviced and cleaned without the service personnel having to enter into the interior compartment of the chemical toilet.

[013] Yet another object of the present invention is to provide a chemical toilet which allows fresh cleaning water to be supplied to the storage tank at the same time that the pumping conduit is pumping liquid and bio-degradeable waste from the storage tank to facilitate better cleaning of the chemical toilet.

[014] A still further object of the present invention is to slope the base surface of the storage tank to direct or channel as much liquid and bio-degradeable waste therefrom during the cleaning process.

[015] The present invention also relates to a chemical toilet comprising a housing having an aperture therein providing access to an interior compartment of the housing, and the interior compartment of the housing having a toilet with an opening communicating with a storage tank; and an exterior wall of the housing

having a wall pumping coupling and a lower portion of the storage tank having a tank pumping coupling and the wall and tank pumping couplings being interconnected with one another by a pumping conduit to facilitate pumping of human waste and liquid from the storage tank via the pumping conduit during servicing of the chemical toilet by a service vehicle.

[016] The present invention also relates to a method of servicing a chemical toilet, the method comprising the steps of accommodating a toilet within a housing and providing the toilet with an opening communicating with a storage tank; placing a wall pumping coupling on an exterior wall of the housing having and connecting a tank pumping coupling to a lower portion of the storage tank, interconnecting the wall pumping coupling with the tank pumping coupling via a pumping conduit; and during servicing of the chemical toilet by a service vehicle, connecting a vehicle pump coupling to the service vehicle and pumping human waste from the storage tank to a collection reservoir of the service vehicle.

[017] BRIEF DESCRIPTION OF THE DRAWING(S)

[018] The invention will now be described, by way of example, with reference to the accompanying drawings in which:

[019] Fig. 1 is a diagrammatic front elevational view of a prior art chemical toilet;

[020] Fig. 2 is diagrammatic cut away front elevational view of the storage tank showing prior art technique for pumping out the storage tank;

[021] Fig. 3 is a diagrammatic cut away perspective view showing the various components of a prior art chemical toilet;

[022] Fig. 4 is a diagrammatic cut away perspective view showing the basic features of the improved chemical toilet according to the present invention;

[023] Fig. 5 is a diagrammatic cross-sectional view showing a portion of the base surface and trough of the storage tank and another embodiment of the shield;

[024] Fig. 6 is a diagrammatic cross-sectional view showing a portion of the base surface and trough of the storage tank and another embodiment of the shield;

[025] Fig. 7 is a diagrammatic cross-sectional view showing the base of the storage tank of the chemical toilet;

[026] Fig. 8 is a diagrammatic cross-sectional view showing another embodiment of the base of the storage tank of the chemical toilet;

- [027] Fig. 9 is a diagrammatic view of the important components of a service vehicle for a chemical toilet;
- [028] Fig. 10 is a diagrammatic view showing a spray hose attachment for the fresh water ball valve;
- [029] Fig. 11 is a diagrammatic view showing a rigid pipe attachment for the pumping ball valve; and
- [030] Fig. 12 is a diagrammatic plan view showing a plurality of chemical toilets interconnected by a common pump manifold and a common supply manifold to facilitate simultaneous servicing of the plurality of chemical toilets.

[031] DETAILED DESCRIPTION OF THE INVENTION

[032] With reference now to Figs. 4 - 8, a detailed description concerning various features of the present invention will now be provided. As can be seen in these Figures, the chemical toilet 2 generally comprises a housing 4 having a base surface 5 and four exterior side walls 9. In addition, the housing 4 includes a roof (not shown in these Figures), which shelters the chemical toilet 2 as well as a door (not shown in these Figures) which provides access to the interior compartment 8 of the chemical toilet 2. The door typically includes a conventional locking mechanism so that a user of the chemical toilet 2 can lock the door while the chemical toilet 2 is occupied.

[033] A urinal 16 is typically provided along one side wall 9 of the housing 4 while the toilet 10 is located adjacent a rear wall 9 of the housing 4. The toilet 10 has a toilet opening 26 which provides access to an internal storage tank 20 of the toilet 10. The storage tank 20 is typically filled with a desired volume of disinfectant and/or chemical solution, e.g., between two and five gallons, for example, to help decrease the odor caused by use of the chemical toilet 2 as well as increase the length of time between required servicing of the chemical toilet 2.

[034] As can be seen in Figs. 4 - 7, the base surface 32 of the storage tank 20 is slightly inclined, i.e., has a pitch of between 10 and 15 degrees and the pitch of the base surface 32 facilitates channeling of the human waste and other liquid during cleaning of the storage tank 20 toward a recessed trough 36. The recessed trough 36 is formed along an elongate lower edge 34 of the storage tank 20 and preferably has a diameter of about 3 inches or so. An opening 38 is provided in

a front side wall 40 of the storage tank 20, adjacent one end of the trough 36, and a tank pumping coupling 64 is connected to this opening 38. A shield 44 is attached to an inwardly facing surface 46 of the storage tank 20 and the shield 44 is angled downwardly from an inwardly facing surface 46 of the storage tank 20, at an angle of about 30 degrees or so, toward the base surface 32 of the storage tank 20. The remote free edge 48 of the shield 44 is spaced, by about 1 to 2 inches or so, from a transition between the inclined planar base surface 32 of the storage tank 20 and the trough 36 (see Fig. 7). This spacing of the remote free edge 48 of the shield 44 from the transition in the base surface 32 of the storage tank 20 is selected so as to prevent soda cans, bottles and other solid non-human waste from entering into the trough 36 and being pumped therefrom during servicing of the chemical toilet 2.

[035] A urinal 16 is also accommodated within the internal compartment 8 of the chemical toilet 2. The urinal 16 communicates with the storage tank 20 by a urinal conduit 22 having a first end thereof connected to a lower drainage region 50 of the urinal 16 and a second opposed end connected to the storage tank 20 so that all of the fluid from the urinal 16 is conveyed to and deposited in the storage tank 20. Typically, the discharge from the urinal conduit 22 will be directed onto a top surface of the shield 44 in the storage tank 20, although this fluid may be discharged at any location within the storage tank 20.

[036] As is conventional, a vent 52 is coupled to an upper region of the storage tank 20 and the vents 52 extends through a roof 54 of the chemical toilet 2. The vent 52 facilitates exhausting of the odors and fumes from the storage tank 20 to the exterior environment.

[037] The tank pumping coupling 64 is attached to one end of the trough 36 (see Fig. 4). The tank pumping coupling 64 comprises a head component (not separately labeled) located within the storage tank 20 and a smaller diameter hollow threaded shaft (not separately labeled) integral with the head section. The hollow threaded shaft passes through the opening 38 in the storage tank 20, slightly larger than a diameter of the hollow threaded shaft, and a pump nipple (not separately labeled), with a mating internal thread, threadingly engages with the hollow threaded shaft to secure the tank pumping coupling 64 to the storage tank 20 in a water tight manner. The pump nipple carries a conventional fitting which

mates with a first end 27 of a pumping conduit 25 while a second end 29 of the pumping conduit 25 is connected to a male recess pumping coupling 68. The head component of the tank pump coupling 64 has an inlet which communicates with the hollow shaft to allow fluid to pass through the tank pumping coupling 64 to the pumping conduit 25.

[038] A recess 56 is formed in one of the exterior walls 9 of the housing 4, preferably the front wall 9 or one of the two side walls, and the recess 56 accommodates the male recess pumping coupling 68. The recess 56 generally comprises four side walls 60 and a base wall 62. As partially shown in Fig. 4, the recess 56 has a door 57 which is sized to completely enclose and cover the opening 58 of the recess 56. The door 57 is hingedly connected, at 59, along a bottom edge of the recess 56 to facilitate pivoting movement of the door 57 into a lowered open position, shown in Fig. 4, which allow authorized personnel to access the recess 56 and a closed position (not shown) which prevents access to the recess 56. Gravity will retain the door 57 in its closed position, a conventional keyed lock 61 is generally provided along a top edge of the door 57 which engages with a cooperating feature (not shown) provided in the recess 56 to facilitate locking of the door 57 and preventing unauthorized personnel from gaining access to the recess 56.

[039] The male recess pumping coupling 68 comprises a head component (not separately labeled) located within the interior compartment of the chemical toilet 2 and a smaller diameter hollow threaded shaft (not separately labeled) is integral with the head section. The hollow threaded shaft passes through a first base aperture 66 in the base wall 62 of the recess 56, slightly larger than a diameter of the hollow threaded shaft, and a pump nipple 70, with a mating internal thread (not separately labeled), threadingly engages with the hollow threaded shaft to secure the male recess pumping coupling 68 to the recess 56. The pump nipple 70 is a conventional quick connect male fitting which mates with a quick connect female pump fitting 132 of the service vehicle 100, as will be discussed below in further detail. The head component of the male access pump coupling 68 has an inlet which communicates with the hollow shaft to allow fluid to pass from the pumping conduit 25 through the male recess pumping coupling 68 to the quick connect female pump fitting 132 of the service vehicle 100.

[040] At least one and preferably a plurality of spray nozzles 72 are located within the storage tank 20. The plurality of spray nozzles 72 are all arranged to spray fresh water at desired location(s) within the storage tank 20. Preferably the spray nozzles 72 are arranged to spray at least the base surface 32 and preferably a majority or all of the side walls 40 and of the storage tank 20 as such spraying facilitates rinsing and/or flushing of the storage tank 20 during servicing of the chemical toilet 2. Each one of the spray nozzles 72 is interconnected with one another via a common fresh water supply manifold 74 and an inlet of the common fresh water supply manifold 74 is connected to a tank supply coupling 78 secured to one of the side walls 40 of the storage tank 20.

[041] The tank supply coupling 78 comprises a head component (not separately labeled) located within the storage tank 20 and a smaller diameter hollow threaded shaft (not separately labeled) integral with the head section. The hollow threaded shaft passes through a second opening in the storage tank 20, slightly larger than a diameter of the hollow threaded shaft, and a supply nipple (not separately labeled), with a mating internal thread, threadingly engages with the hollow threaded shaft to secure tank supply coupling 78 to the storage tank 20 in a water tight manner. The supply nipple carries a conventional fitting which mates with a first end 80 of a fresh water conduit 82 while a second end 84 of the fresh water conduit 82 is connected to a male recess supply coupling 88. The head component of the tank supply coupling 78 has an inlet which communicates with the hollow shaft to allow fresh water to pass from the fresh water conduit 82 through the tank supply coupling 78 and flow through the common fresh water supply manifold 74 to supply water to each one of the spray nozzles 72. If desired, an upper region of the urinal 16 may also be provided with at least one spray nozzle 72 to facilitate simultaneous cleaning or flushing of the interior of the urinal 16 during routine servicing of the chemical toilet 2. If a spray nozzle(s) 72 is provided in the urinal 16, generally a "tee" or a Y fitting 83, only diagrammatically shown in dashed lines in Fig. 4, is coupled to the fresh water conduit 82 and a urinal fresh water conduit 85 interconnects the spray nozzle(s) 72 of the urinal 16 with the "tee" or a Y fitting 83.

[042] The male recess supply coupling 88 comprises a head component (not separately labeled) located within the interior compartment of the chemical toilet

2 and a smaller diameter hollow threaded shaft (not separately labeled) integral with the head section. The hollow threaded shaft passes through a second base aperture 86 in the base wall 62 of the recess 56, slightly larger than a diameter of the hollow threaded shaft, and a male supply nipple 90, with a mating internal thread (not separately labeled), threadingly engages with the hollow threaded shaft to secure the male recess supply coupling 88 to the recess 56. The supply nipple 90 is a conventional quick connect male fitting which mates with a quick connect female supply fitting 122 of the service vehicle 100, as will be discussed below in further detail. The head component of the male recess supply coupling 88 has an inlet which communicates with the hollow shaft to allow fluid to pass from the quick connect female supply fitting 122 of the service vehicle 100 through the male recess supply coupling 88 to the fresh water conduit 82 and on to the spray nozzles 72.

[043] It is to be appreciated that rather than having a shield 44 to prevent large objects and other non-human waste from entering into the trough 36, the trough 36 may be provided with a coarse screen 45 (see Fig. 5) or grate 47 (see Fig. 6) both having a sufficient porosity, e.g., 2 inch by 2 inch openings for example, to allow desired human waste and other fluids to pass readily therethrough but prevent bottles, cans and other undesired objects from entering into the drainage area of the trough 36 and being pumped out of the storage tank 20 during servicing.

[044] Further, although the disclosed embodiment shows an inclined base surface 32, it is to be appreciated that the base surface 32 of the storage tank 20 may be funnel shaped (see Fig.8), instead of being inclined, to facilitate funneling of all of the human waste and other fluids toward a centrally located drainage area rather than having the inclined surface channel or redirect the fluid and debris toward the trough 36, as with Figs. 4-7. A central drain in the funnel shaped surface 32 may be covered with a coarse screen 45 or grate to prevent large objects and other non-human waste from entering into the central drain.

[045] As can be seen in Fig. 9, the service vehicle 100 typically includes a fresh water supply source 112, e.g., typically 100 to 200 gallons of fresh water, as well as a collection reservoir 110 for collecting the pumped human waste, debris and other liquids removed from the storage tank 20 of the chemical toilet 2. The fresh

water supply source 112 includes a pumping device 114, typically powered by a power take-off 116 of the service vehicle or battery operated, which pumps fresh water from the fresh water supply source 112 along a flexible fresh water hose 118 to a quick connect female couple member 120 located at a remote free end thereof. A fresh water ball valve 122 (see Fig. 10), having a mating quick connect male coupling member 124, receives and engages with the female coupling member 120 of the flexible fresh water hose 118 and an opposed end of the fresh water ball valve 122 has a quick connect female coupling 126. The female coupling member 126 of the fresh water ball valve 122 can be coupled to the male recess supply coupling 88 located in the recess 56 of the chemical toilet 2 to facilitate the supply of fresh water to the spray nozzles 72 located within the storage tank 20. The fresh water ball valve 122 includes an internal ball valve which facilitates opening and closing of the supply of fresh water along the fresh water hose 118 to allow the service personnel to control the amount and duration of the fresh water to be supplied to the storage tank 20 during servicing of the chemical toilet.

[046] The collection reservoir 110 also includes a pumping device 128, typically powered by the power take-off 116 of the service vehicle 100 or battery operated, which pumps human waste and debris from the storage tank 20 along a flexible pump hose 108 to the collection reservoir 110. A quick connect female couple member 130 is located at a remote free end of the flexible pump hose 108. A pump ball valve 132 (see Fig. 11), having a quick connect male coupling member 134 at one end, engages with the quick connect female coupling member 130 of the flexible pump hose 108 and an opposite end of the pump ball valve 132 has a quick connect female coupling 136. The quick connect female coupling member 136 of the pump ball valve 132 can be coupled to the male recess pumping coupling 68 located in the recess 56 of the chemical toilet 2 to facilitate the pumping human waste and other fluids from the storage tank 20. The pump ball valve 132 includes an internal ball valve which facilitates turning on and off the pumping of human waste and other fluids from the storage tank 20 to allow the service personnel to control the amount and duration of the human waste and other fluids to be pumped from the storage tank 20. Typically, the fresh water is

supplied to the chemical toilet 2 at the same time while the human waste and other fluids are pumped or removed from the chemical toilet 2.

[047] When servicing of the chemical toilet 2 is required or desired, the service personnel will arrive at the site and park the service vehicle 100 adjacent the chemical toilet(s) 2 to be serviced. The service personnel will connect the female coupling member 126 of the fresh water ball valve 122 to the mating male recess supply coupling 88 located within the recess 56. The service personnel will then also connect the female coupling member 136 of the pump ball valve 132 to the male recess pumping coupling 68 located within the recess 56.

[048] Once the two mating coupling members 126, 132 of the respective ball valves 122, 132 are connected, the fresh water valve 106 for the fresh water supply is then opened so that fresh water is supplied, via the fresh water hose 118, conduit 82, and common fresh water supply manifold 74 to all of the spray nozzles 72 within the interior of the storage tank 20 to all of the desired interior surfaces of the storage tank 20, as well as the base surface 32 of the storage tank 20, so that they are adequately sprayed with fresh water to rinse and/or flush those surfaces during the cleaning process. The fresh water will then drain, due to gravity, downwardly along the inclined of the base surface 32 toward the trough 36 or down the funneled shaped surface to the drain. Simultaneously while this rinsing and/or flushing process is occurring, the pumping valve 113 is opened to pump human waste and other fluid from the trough 36 or drain associated with the storage tank 20 along the pumping conduit 25 and the flexible pumping hose 108 into a vehicle collection reservoir 110. This cleaning process will continue for a sufficient duration of time, e.g., 15 seconds to a minute or so, until the service personnel determines that the chemical toilet 2 is adequately pumped or cleaned, e.g., substantially all of the human waste and other fluids have been removed from the storage tank 20. Once this has occurred, the supply of fresh water is discontinued, by closing the fresh water valve 106, and the pumping process is also discontinued, by closing the pumping valve 113.

[049] If desired, the service personnel can also spray or wash the interior of the chemical toilet 2 with additional fresh water and/or sanitize the same in a conventional manner, as necessary. Finally, the service personnel will add a

desired quantity of a disinfectant solution to the chemical toilet 2 and thereafter the chemical toilet 2 is ready for further use.

[050] With the service vehicle equipped as noted above, the service vehicle 100 is able to service chemical toilets 2 manufactured according to the present invention. In order to service virtually any other previously made chemical toilet 2, a small section of a spray hose 140 (see Fig. 10), e.g., a few feet or so in length, having a quick connect mating male coupling 142 at one end thereof and a conventional water nozzle 144 at the opposite end thereof is utilized. The male coupling 142 of the small section of spray hose 140 is attached to the quick connect female coupling 126 of the fresh water ball valve 122 and this arrangement facilitates spraying of the fresh water from the fresh water supply source 112 out through the water nozzle 144 in a conventional fashion. In addition, a rigid section of pipe 150 (see Fig. 11), e.g., a few feet or so in length, has a quick connect male coupling 152 at one end thereof which is coupled to the quick connect female end 136 of the pumping ball valve 132 and this rigid section of pipe 150 is lowered in through the opening 26 of the toilet 10, as is conventional in the prior art, so that an inlet 154 of the rigid section of pipe 150 is located closely adjacent the base surface 32 of the storage tank 20 to facilitate pumping of fluid and human waste therefrom as is conventionally done in the prior art.

[051] The pumping conduit 25 typically has an outer diameter of between 2 to 3 inches or so, although the size of the conduit 25 may vary depending upon the particular application. The tank supply conduit 82 typically has an outer diameter of between ½ to 2 inches or so, although the size of the conduit 82 may vary depending upon the particular application. Further, the male and the female couplings may be reversed with one another, or other types of readily detachable couplings may be employed, without departing from the spirit and scope of the present invention.

[052] If desired, the pumping conduit 25 and the supply conduit 82 may be covered or otherwise enclosed to prevent an occupant of the chemical toilet 2 from tampering or otherwise accessing the associated conduits and/or couplings while not significantly hampering repair and/or maintenance of those components.

[053] As shown in Fig. 12, it is possible to have a common pump manifold 210 interconnecting a plurality of the male recess pumping couplings 68 with one

another and to have a common supply manifold 200 interconnecting a plurality of male recess supply couplings 88 with one another. The common pump manifold 210 has a common male recess pumping coupling 268 and the common supply manifold 200 has a common male recess supply coupling 288 so that the service personnel, upon connecting the common male recess pumping coupling 268 with the pumping ball valve 132 and connecting to the common supply manifold 288 with the supply ball valve 122, the service vehicle can simultaneously supply fresh water to and pump human waste from each one of the storage tanks 20 of the interconnected chemical toilets 2.

[054] If desired, the fresh water supply source 112 may include a cleaning and/or disinfectant solution to assist with cleaning and/or sanitizing of the urinal and storage tank during servicing of the chemical toilet.

[055] Since certain changes may be made in the above described improved chemical toilet 2, without departing from the spirit and scope of the invention herein involved, it is intended that all of the subject matter of the above description or shown in the accompanying drawings shall be interpreted merely as examples illustrating the inventive concept herein and shall not be construed as limiting the invention.